CLINICAL SCIENCE

QUALITY OF LIFE AMONG HIV-INFECTED PATIENTS IN BRAZIL AFTER INITIATION OF TREATMENT

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INTRODUCTION: Despite improvement in clinical treatment for HIV-infected patients, the impact of antiretroviral therapy on the overall quality of life has become a major concern.
OBJECTIVE: To identify factors associated with increased levels of self-reported quality of life among HIV-infected patients after four months of antiretroviral therapy.
METHODS: Patients were recruited at two public health referral centers for AIDS, Belo Horizonte, Brazil, for a prospective adherence study. Patients were interviewed before initiating treatment (baseline) and after one and four months. Quality of life was assessed using a psychometric instrument, and factors associated with good/very good quality of life four months after the initiation of antiretroviral therapy were assessed using a cross-sectional approach. Logistic regression was used for analysis.
RESULTS: Overall quality of life was classified as 'very good/good' by 66.4% of the participants four months after initiating treatment, while 33.6% classified it as 'neither poor nor good/poor/very poor'. Logistic regression indicated that >8 years of education, none/mild symptoms of anxiety and depression, no antiretroviral switch, lower number of adverse reactions and better quality of life at baseline were independently associated with good/very good quality of life over four months of treatment.
CONCLUSIONS: Our results highlight the importance of modifiable factors such as psychiatric symptoms and treatment-related variables that may contribute to a better quality of life among patients initiating treatment. Considering that poor quality of life is related to non-adherence to antiretroviral therapy, careful clinical monitoring of these factors may contribute to ensuring the long-term effectiveness of antiretroviral regimens.

KEYWORDS: Antiretroviral therapy; Anxiety; Depression; Adverse reactions; Antiretroviral therapy switch.

INTRODUCTION

The development of combined antiretroviral therapy has shifted the perception of HIV/AIDS from a fatal to a chronic and potentially manageable disease. Antiretroviral therapy is capable of improving survival, reducing the occurrence of HIV-related opportunistic infections and improving the patients' quality of life (QL).[1] Clinical improvement of HIV-infected patients under antiretroviral therapy (ART) has often been measured by reduction in mortality, opportunistic infection rates or severe AIDS-related symptoms.[2] However, overall assessments of quality of life among people living with HIV/AIDS have also become a major focus of interest as more efficacious and simpler regimen treatments are available. ART is highly effective and has the ability to bring significant benefits, which, despite unpleasant side effects and interference with daily activities and social routine, have a positive global outcome with regard to quality of life and general health.[3]

Several factors associated with better quality of life among HIV-infected patients have been reported in international literature. Sociodemographic characteristics such as male gender[4], younger age,[5] higher socioeconomic status[6] and

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employment[6] have been associated with improvement in QL. Other variables such as lower HIV viral load[7], greater CD4+ cell count,[5,7,8] fewer or less bothersome HIV symptoms,[9] and higher levels of hemoglobin[10] have been shown to be important clinical/immunological indicators of better quality of life. In addition, patients with no difficulty in taking medications,[5] those using regimens with a lower number of pills,[5] and those more adherent to ART[4,6,7] tend to have improved quality of life following the start of treatment.

Moreover, the association between a better quality of life and the absence of psychiatric disorders and symptoms among people living with HIV/AIDS has been documented in several studies. Ruiz-Pérez et al. (2005) indicated that the absence of probable psychiatric disorders was associated with better scores in both physical health and mental health domains of health-related quality of life as measured by the MOS-HIV (Medical Outcomes Study HIV Health Survey). Murdaugh et al. (2006) indicated that HIV-infected women who reported fewer depressive symptoms had higher quality of life scores.

Despite the wide variety of instruments available to measure quality of life, there is no clear worldwide standard definition [12]. According to the World Health Organization Quality of Life Group (WHOQOL Group), quality of life can be defined as *"the individuals' perception of their position in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns*".[13]

There are few studies of quality of life among people living with HIV/AIDS in developing countries,[14] including Brazil.[15,16] In addition, no prospective studies have evaluated the impact of antiretroviral therapy on the quality of life of ART-naive patients following treatment initiation in the Brazilian context of universal access to ART and specialized care for HIV/AIDS. In addition, ART is capable of providing an important impact on patient quality of life even during the first months of treatment. According to Mannheimer et al. (2005), significant improvements in mean quality of life were seen for HIV patients enrolled at two multi-center antiretroviral clinical trials after one and four months on new ART regimens; these improvements persisted for 12 months. Thus, the aim of this study was to identify factors associated with better levels of self-reported quality of life after four months of ART among HIV infected patients initiating treatment at two public health referral centers for HIV/AIDS in Belo Horizonte, Brazil.

MATERIALS AND METHODS

Participants

This analysis is part of the ATAR project, which was carried out in two AIDS public referral centers in Belo Horizonte (Brazil) from 2001 through 2003. The main objective of the study was to determine the incidence and determinants of non-adherence to antiretroviral therapy among HIV-infected patients who had initiated treatment.[17] The ATAR project included one baseline interview on the same day that patients received their first prescription for ART and three follow-up interviews at the first, fourth and seventh month thereafter (follow-up visits one, two and three, respectively). The baseline interview assessed sociodemographic, treatment-related and behavioral characteristics, while follow-up visits evaluated adherence and other treatment-related variables including ART switch, degree of difficulty and adverse reactions related to ART. Quality of life and symptoms of anxiety and depression were assessed at baseline and at the second follow-up visit (i.e., four months after the start of antiretroviral therapy). Additionally, clinical variables (e.g., clinical classification of AIDS, CD4+ cell count, viral load for HIV, and exposure category for HIV infection) were collected from medical charts. Participants signed a written informed consent and ethical approval was obtained from the Ethical Committee Board of both participating centers and from the Federal University of Minas Gerais.

Recruitment occurred at the main public referral centers for HIV/AIDS in the city: Infectious and Parasitic Diseases Training and Reference Center from the City Health Department, and Eduardo de Menezes Hospital, from the State Health Department. Participants who were at least 18 years old and antiretroviral-naive were invited to participate in our study when they visited the centers for their first ART. Participants were assessed soon after receiving their first antiretroviral drugs from the pharmacy at each of the centers (baseline interview) and in the follow-up visits. For this analysis, only those who completed the quality of life assessment at baseline and at the second follow-up visit were included. Pregnant women were excluded from this analysis since most were taking antiretroviral medications for only a limited amount of time to prevent mother-to-child transmission.

Event and exposure measurements

Quality of life

Quality of life was evaluated using the brief version of the World Health Organization Quality of Life instrument (WHOQOL-bref), a 26-item generic instrument derived from the complete WHOQOL-100 version.[18] This scale has been validated in many countries, including Brazil, and has adequate psychometric characteristics such as internal consistency, discriminating validity and reliability.[13,18]

We used the overall perception of quality of life as the outcome measurement in a cross-sectional analysis approach during visit two, which occurred at approximately four months after treatment initiation. Assessment was performed by asking patients to classify their quality of life as 'very poor', 'poor', 'neither poor nor good', 'good' and 'very good'. This single item approach has been suggested to be a good indicator of self-reported quality of life.[19]

Exposure variables

Exposure variables for this analysis were chosen by considering the conceptual framework for quality of life in HIV/AIDS proposed by Vidrine et al. (2005), which suggests that health outcomes fall along a continuum that begins with biological/physiological variables, is followed by symptoms and measures of functional abilities, and ends with general health perceptions and overall quality of life. In addition, the framework suggests that behavioral factors and socioeconomic status have significant effects on this continuum and should be carefully examined when evaluating quality of life data among HIV-infected patients. Thus, we included sociodemographic characteristics (e.g., sex, age, skin color), clinical variables (e.g., time since diagnosis, AIDS clinical classification, late ART initiation, and symptoms of anxiety and depression), behavioral data (e.g., exposure category for HIV infection and alcohol use), measures of functional abilities (perceived improvement for ten specific items evaluating health status), treatment-related factors (use of protease inhibitors, self-reported degree of difficulty related to ART, self-reported adverse reactions related to ART, adherence to ART), and overall quality of life at baseline as explanatory variables. We collected information on the antiretroviral regimen prescribed for each patient. This variable was then dichotomized and patients were classified based on the use of at least one protease inhibitor (PI) drug plus nucleoside/nucleotide analog reverse transcriptase inhibitors and non-nucleoside analog reverse transcriptase inhibitors, or only nucleoside/nucleotide analog reverse transcriptase inhibitors combined with non-nucleoside analog reverse transcriptase inhibitors. The skin color was a self-reported characteristic. Late ART initiation was defined as a CD4+ T cell count under 200 cells/mm^3 or any AIDS defining condition (CDC clinical classification "C") at baseline, as recorded in the medical record. AIDS clinical classification was defined according to the Centers for Disease Control and Prevention (1992).[21] Time since diagnosis was defined as the time interval between the HIV test result and the first prescription for ART.

Anxiety and depression symptoms were assessed using the Hospital Anxiety and Depression Scale (HADS).[22] HADS has been validated in many countries, including Brazil[23], and it has been applied to non-psychiatric patients. Participants were classified regarding the level of symptoms of anxiety and depression according to Zigmond and Snaith (1983). Scores over 14 were considered as severe anxiety/depression, 11-14 as moderate, 8-10 as mild or "subclinical" and under 8 as absence of symptoms of anxiety/depression. Anxiety and depression scores were analyzed separately and both were categorized as dichotomous variables, comparing participants with lack of or mild symptoms to those with moderate or severe symptoms.

During the second visit, patients were asked to report whether they had had any improvement in ten specific items related to their health status including energy, pain/physical discomfort, dependence on other people, ability to walk, ability to work, memory/ability to concentrate, physical appearance, self-esteem, personal relationships and sexual life. Each item was considered separately in our analysis.

Adverse reactions related to ART were self-reported. We collected information on gastrointestinal, neurological and dermatological issues in addition to anemia, fatigue, fever and other freely reported reactions. Patients were specifically asked if they had experienced each of these. We used the mean value of adverse reactions reported at visit two (mean = 2) to categorize this variable. Similarly, self-reported degree of difficulty related to antiretroviral therapy was categorized as a dichotomous variable; this allowed us to compare participants who classified their treatment as having 'low and very low difficulty' to those who described it as having 'medium, high and very high difficulty' at visit two, at the four month mark. Finally, adherence to ART was defined as taking at least 95% of all prescribed doses in the last three days prior to the visit two follow-up, based on evidence that optimal virologic success declines rapidly in patients taking fewer than 95% of their prescribed doses.[24]

Data analysis

For analysis purposes, we dichotomized the outcome variable (i.e., overall perception of quality of life), comparing 'neither poor nor good, poor and very poor' quality of life to 'good and very good' quality of life, due to power considerations. The chi-square test was used for analysis of categorical data. The magnitude of the associations was estimated by the odds ratio (OR) with 95% confidence interval (95% CI). The level of significance considered was 0.05. Quality of life at baseline and at visit two were compared using McNemar's test. The independent association between potential explanatory variables and better quality of life at visit two was assessed by multivariate analysis using logistic regression. Variables statistically associated with good or very good quality of life in the

univariate analysis (p-value less than .20) were considered for modeling. Sequential deletion was conducted until a final model was obtained that included only variables showing statistical significance at a p-value under .05. The Wald test was used to assess the importance of each variable and the likelihood ratio test was used to compare models. Adequacy of the final model was evaluated using the Hosmer-Lemeshow test.[25]

RESULTS

Descriptive characteristics

Among the 406 participants recruited for the ATAR project, 314 (77.3%) returned for the second follow-up visit and 297 (73.2%) completed the WHOQOL-bref during both baseline and second visits. After excluding 35 women on ART because of pregnancy, 262 (64.5%) individuals were eligible for this analysis. No statistically significant difference was observed between participants and non-participants or those lost to follow-up regarding age, sex or site of medical assistance. Median time between baseline and the second visit was 122 days. During the second visit, 16.4% and 50.0% classified their quality of life as 'very good' and 'good', respectively, while 24.5% classified their quality of life as 'neither poor nor good', 5.3% as 'poor' and 3.8% as 'very poor'. We observed a statistically significant improvement in the perception of quality of life when comparing the baseline with the second visit assessments. One hundred fifty-four (58.8%) and 108 (41.2%) patients considered their quality of life 'good/very good' and 'neither poor nor good/poor/very poor' at baseline as compared to the proportions reported at the second visit (66.4% and 33.6%, respectively) (McNemar's test=4.88; p-value=0.027).

Most participants were male (66.0%), less than 35 years old (53.0%), and single, divorced or widowed (64.1%). Half had little schooling (< 8 years), and 33.9% had a family income of one minimum wage (US$ 80) or no income at all in the last month prior to the baseline interview. Approximately 20.0% of the participants were living alone, while 11.8% and 68.3% were living with a partner or other people including children, relatives and friends. The proportion of better quality of life was higher among men and participants with a family income in the last month that was greater than one minimum wage (Table 1).

For most participants, the length of time between HIV diagnosis and the first antiretroviral prescription was greater than 90 days (57.3%). At the baseline interview, 53.8% were symptomatic or presented at least one AIDS-defining condition, 42.0% had LTCD4 counts $\leq$ 200 cells/mm^3, and the median HIV viral load was 124,000 copies/mL. However, due to the high proportion of missing values for HIV viral load (54.5%), this variable was not considered for further analysis. Also, the percentage of patients initiating antiretroviral therapy with a low CD4+ cell count or advanced disease (66.7%) was remarkably high.

There was a higher proportion of participants that reported lack of or mild symptoms of anxiety (80.9%) and depression (84.7%) at the second visit as compared to the frequency of none/mild anxiety and depression symptoms at baseline (63.0% and 78.6%, respectively) (data not shown). Of these patients, only 11.8% reported the use of anxiolytic and/or antidepressive medications during the follow-up period. Most reported not using injected drugs during their lifetime (93.9%) or alcohol in the last month prior to the baseline interview (63.4%).

Following the initiation of ART, participants reported some improvement regarding health status including energy (51.1%), self-esteem (40.8%), physical appearance (40.4%), pain/physical discomfort (37.0%), ability to work (35.9%), ability to walk (31.7%), memory (29.0%), personal relationships (28.2%), and dependence on other people (27.5%), but only 14.9% reported improvement in their sex life.

Approximately half of the participants initiated ART with a regimen containing protease inhibitors, with 44.3% taking less than eight pills of antiretroviral drugs per day, and 79.4% remained on the same antiretroviral regimen during the follow-up period.

Four months after initiating ART, 58.5% of the individuals classified their treatment as easy or very easy, 88.9% reported two or less adverse reactions related to ART, and a high proportion (79.0%) were adherent to treatment.

Univariate analysis

Among the sociodemographic variables, a statistically significant association was observed between male sex, eight or more years of formal education, family income in the last month equal to or under one minimum wage (US$80) or greater than one minimum wage and a better quality of life (good/very good) (Table 1). Participants with lack of or mild symptoms of anxiety and depression and those who reported not using injected drugs during their lifetime had a greater chance of classifying their quality of life as good/very good at the second visit. In addition, the perception of improvement in overall energy, ability to walk, ability to concentrate, physical appearance, self-esteem, personal relationships and sexual life were associated with better quality of life. Also, maintaining same antiretroviral regimen during the follow-up period, perception of the degree of difficulty related to ART as easy or very easy, having a lower

Table 1 - Univariate analysis of factors associated with good or very good quality of life (QL) at month 4 among participants (n=262), ATAR Project, Brazil, 2001-2003

Characteristics	QL good/very good OR (95% CI)	p-value
Sociodemographics		
1. Center (*HEM*)	0.74 (0.39-1.39)	0.343
2. Male sex	1.70 (0.99-2.90)	0.049
3. Age ≤ 35 years old	0.91 (0.55-1.53)	0.731
4. Skin color (white)	0.97 (0.54-1.75)	0.920
5. Marital status (single, divorced or widowed)	1.28 (0.76-2.19)	0.350
6. Education (≥ 8 years)	2.48 (1.46-4.22)	0.001
7. Family income in the last month:		
None	1.00	
≤ 1 MW [a]	0.51 (0.26-0.98)	0.041
> 1 MW	1.96 (1.16-3.31)	0.011
8. Housing partnership:		
Living with partner	1.00	
Living with others	1.38 (0.80-2.37)	0.246
Living alone	0.94 (0.50-1.79)	0.861
Clinical		
9. Time since diagnosis (days):		
≤ 30	1.00	
31 - 90	1.56 (0.89-2.76)	0.121
> 90	0.78 (0.46-1.31)	0.338
10. No late ART initiation (CD4 < 200 cells/mm^3 or any AIDS defining condition at baseline)	0.97 (0.55-1.72)	0.922
11. Symptoms of anxiety at visit two (none/mild)	10.26 (4.98-21.12)	<0.001
12. Symptoms of depression at visit two (none/mild)	11.86 (5.16-27.24)	<0.001
Behavioral		
13. Injection drug use in lifetime (no)	2.72 (0.98-7.56)	0.047
14. Alcohol use in the prior month to baseline (no)	0.98 (0.58-1.67)	0.947
Functional abilities		
15. Perceived improvement of energy at visit two (yes)	1.87 (1.11-3.16)	0.018
16. Perceived improvement of pain/physical discomfort at visit two (yes)	1.41 (0.82-2.43)	0.213
17. Perceived improvement of dependence on other people at visit two (yes)	1.10 (0.62-1.98)	0.728
18. Perceived improvement of the ability to walk at visit two (yes)	1.94 (1.07-3.48)	0.026
19. Perceived improvement of the ability to work at visit two (yes)	1.66 (0.95-2.90)	0.072
20. Perceived improvement of memory/ability to concentrate at visit two (yes)	2.38 (1.27-4.45)	0.006
21. Perceived improvement of physical appearance at visit two (yes)	2.04 (1.18-3.53)	0.010
22. Perceived improvement of self-esteem at visit two (yes)	2.09 (1.21-3.61)	0.008
23. Perceived improvement of personal relationships at visit two (yes)	2.26 (1.20-4.23)	0.010
24. Perceived improvement of sexual life at visit two (yes)	2.60 (1.10-6.17)	0.025
Treatment-related behaviors		
25. Use of other medications during follow-up period:		
None	1.00	
Others	1.29 (0.77-2.16)	0.328
Anxiolytic/antidepressive meds	0.67 (0.31-1.43)	0.295
26. Use of protease inhibitor (no)	1.07 (0.64-1.79)	0.792
27. ART switch during follow-up period (no)	2.66 (1.44-4.90)	0.001
28. Daily number of antiretroviral pills (< 8)	1.07 (0.64-1.79)	0.800
29. Self-reported degree of difficulty related to ART at visit two (easy, very easy)	2.02 (1.20-3.42)	0.008
30. Self-reported adverse reactions (AR) related to ART at visit two (≤2)	3.81 (1.71-8.49)	0.001
31. Self-reported adherence to ART at visit two (adherent)	2.10 (1.14-3.85)	0.016
32. Overall quality of life at baseline (good/very good)	4.43 (2.57-7.65)	<0.001

[a] Minimum Wage (US$80)

Table 2 - Adjusted model for multivariate analysis of good/very good quality of life at month 4 among participants (n=262), ATAR Project, Brazil, 2001-2003

Characteristics	*Good or very good QL at the 2nd visit* [a]	
	OR (95% CI)	p-value
Education ≥8 years	2.05 (1.07-3.92)	0.029
Lack of/mild symptoms of anxiety at visit two	4.31 (1.84-10.12)	<0.001
Lack of/mild symptoms of depression at visit two	4.91 (1.85-12.98)	0.001
No ART switch during follow-up period	2.08 (1.00-4.34)	0.050
≤2 adverse reactions related to ART at visit two	3.52 (1.30-9.50)	0.013
Good/very good quality of life at baseline	3.40 (1.79-6.44)	<0.001

[a] Hosmer-Lemeshow Test: $\chi^2 = 0.918$; degree of freedom; p-value= 0.969

number of adverse reactions, and being adherent to therapy were all associated with better quality of life at the second visit. Finally, participants who classified their quality of life as good or very good at baseline had a greater chance of reporting good or very good quality of life at the second visit.

Multivariate analysis

Logistic regression indicated that eight or more years of formal education (OR=2.05; 95% CI=1.07-3.92), non-occurrence or presence of mild symptoms of anxiety (OR=4.31; 95% CI=1.84-10.12) and depression (OR=4.91; 95% CI=1.85-12.98), maintaining the same antiretroviral regimen during the follow-up period (OR=2.08; 95% CI=1.00-4.34), having a lower number of adverse reactions (OR=3.52; 95% CI=1.30-9.50) and reporting better quality of life at baseline (OR=3.40; 95% CI=1.79-6.44) were independently associated with good/very good quality of life over four months of treatment (Table 2).

DISCUSSION

By using a single facet of the WHOQOL-bref instrument, we were able to assess the patients' quality of life four months after initiating ART (visit two), based on the individuals' perceptions, values and preferences. This instrument could be easily applied to a health service scenario and would be an important tool for assessing patients' quality of life at the onset of treatment and over the course of treatment. The WHOQOL-bref has the advantage of including a broader, multidimensional concept of quality of life, and providing a global measure of quality of life in a single item[12]. Although we were not able to assess quality of life data longitudinally over the treatment course in more than one follow-up visit, we found a high proportion of patients who reported good or very good quality of life after approximately four months of ART (66.4%) and a statistically significant difference when comparing these results with the baseline assessment; this suggests an improvement of reported QL after initiating treatment. Similarly, Mannheimer et al. (2005) described a significant improvement of QL at the first, fourth and twelfth months in a sample of 1050 HIV-infected individuals receiving ART in two large multi-center antiretroviral clinical trials. By examining quality of life among ART-naive patients following treatment initiation, we were able to identify important variables associated with a better perception of quality of life based on the individual's assessment.

Overall self-perception of quality of life has been shown to be a useful screening item for assessing global quality of life.[12,19] Despite the difficulties in comparison with other studies due to methodological issues such as study design and population heterogeneity, many authors have used this item as an outcome variable for quality of life analyses in different settings. We found a lower proportion of good and very good quality of life as compared to individuals seeking primary care services in Porto Alegre, Brazil (73.3%).[26] Norekval et al. (2007) conducted two cross-sectional surveys to evaluate quality of life using the WHOQOL-bref on female myocardial infarction survivors and the general Norwegian population. The proportion of good and very good quality of life among female myocardial infarction survivors was similar to our findings (67%); however, a higher proportion of good and very good quality of life was found among the general population of that country (79%). Also, we found a higher proportion of good or very good quality of life as compared to individuals at various stages of their illness recruited at an HIV counseling clinic in Bangalore, India (18%).[11] It is likely that favorable conditions of free and universal access to HIV/AIDS care and treatment in Brazil as compared to India during the same time period influenced this result.

Symptoms of anxiety and depression are important

factors related to quality of life since they may contribute to unfavorable HIV clinical course by worsening immune function[28] or affecting the patient's behavior,[29] perception of the degree of difficulty with the treatment[3,30] and adherence to treatment.[31] The impact of psychiatric symptoms on the quality of life of patients with HIV/AIDS has been highlighted previously.[15,32] More importantly, Chan et al. (2003) described a statistically significant reduction in psychiatric symptoms when comparing different treatment groups in a representative sample of HIV-infected patients receiving care in the United States, including patients receiving ART at baseline and follow-up, patients who initiated ART at baseline, patients who were on ART only at baseline and patients who were not on ART. Despite the cross-sectional nature of the current study, our results suggest a strong association between lack of and mild symptoms of anxiety and depression and a better quality of life. This suggests that patients experiencing moderate and severe symptoms of anxiety and depression could potentially benefit from appropriate intervention (i.e., counseling, diagnosis and pharmacological and non-pharmacological treatment). Therefore, we emphasize the importance of evaluating the occurrence of anxiety and depression among HIV-infected patients prior to initiating ART and during the treatment course as an important tool to potentially improve the quality of life and contribute to enhanced treatment effect via better adherence to ART.

Treatment-related factors were found to be barriers to a good quality of life. This is consistent with the literature, which indicates that maintaining the same antiretroviral regimen during the follow-up period and a having a lower number of adverse reactions secondary to the use of ART are related to a better quality of life.[34,35] These results underline the importance of treatment-related variables as markers of post-treatment quality of life and the need to develop intervention strategies focused on symptoms related to ART and regimen switch along the treatment course. Accurate assessment and management of adverse reactions should be part of a comprehensive healthcare plan among patients with HIV/AIDS, thus optimizing patients' satisfaction with treatment and their adherence.

Education, a proxy of socioeconomic status, has also known been shown to influence quality of life. Our analysis showed that patients with higher education reported better quality of life, possibly due to better knowledge about their treatment and disease, access to health services or functional status.[36,37] This result is similar to those from other studies among HIV/AIDS patients[37] as well as among different populations, including a sample of men with prostate cancer[38] and the general population in Sweden.[39] Less education in combination with the adverse and physical consequences of HIV/AIDS may be particularly detrimental to quality of life outcomes.

Previous studies have suggested that a better perception of quality of life at baseline is a strong predictor of better quality of life after initiating ART,[8,35] a potential carry-over effect during the course of treatment. Also, patients with worse quality of life at baseline could have higher proportions of anxiety and depression symptoms as well as a worse clinical condition for AIDS; this could negatively affect quality of life at follow-up, independent of adherence to ART. Because baseline values may influence future levels of quality of life,[35] multivariate analysis should take into account the quality of life perception at baseline. This association was confirmed in our findings. However, given our cross-sectional approach, the independent association between baseline assessment of quality of life and good/very good quality of life at month four should be interpreted with caution.

Although we did not find a statistical association between adherence to ART and good or very good quality of life in the multivariate analysis, other authors have described this association.[4,7] According to Mannheimer et al. (2005), participants reporting 100% ART adherence achieved significantly higher quality of life scores at 12 months of follow-up as compared to those with poorer adherence, particularly when 100% adherence was sustained (at months 1, 4, 8 and 12) ($p</0.001$). The short period of observation between the two visits in our study and lack of statistical power could partially explain our findings. Although other authors have described an association between better quality of life and male gender[4] and higher family income[6], this is not consistent in the literature.

This study reports a significant improvement in overall quality of life four months after initiation of ART for patients receiving antiretroviral medications at two HIV/AIDS referral centers in Brazil. Our results indicate that the patients could benefit from an easy and simple screening tool for perceived quality of life before and during the treatment course, as quality of life could be easily assessed in the health service scenario by using one single facet of the WHOQOL-bref. Clinical assessment of adverse reactions during the course of treatment and a careful monitoring after any antiretroviral switch could contribute to a better quality of life, improve the patient-physician relationship and potentially maintain adherence with fewer undesired side effects. Also, patients would benefit from an early and continuous assessment of psychiatric symptoms including early diagnosis of psychiatric disorders and implementation of specific pharmacological and non-pharmacological treatments such as counseling and psychotherapy. Because poor quality of life is associated with non-adherence[4] and

previous studies have suggested that anxiety, depression, and adverse reactions to ART and ART switch are strong predictors of non-adherence to ART,[3,17] these strategies may also contribute to improvement of adherence to ART in these public settings.

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